

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-46. (cancelled)

47. (currently amended) A dual-chain avidin (dcAvd) comprising a fusion of two circularly permuted avidin monomers (cpAvd), the avidin monomers selected ~~from circularly permuted monomers of:~~

circularly permuted avidin monomer comprising a new N-terminus that is before β -strand 5 and a new C-terminus that is after β -strand 4 (cpAvd5 \rightarrow 4);

circularly permuted avidin monomer comprising a new N-terminus that is before β -strand 6 and a new C-terminus that is after β -strand 5 (cpAvd6 \rightarrow 5); and

circularly permuted avidin monomer comprising a new N-terminus that is before β -strand 4 and a new C-terminus that is after β -strand 3 (cpAvd4 \rightarrow 3),

wherein in the cpAvd, the original C-terminal amino acid of ~~one of the two avidin monomers~~ and the original N-terminal amino acid ~~of a second of the two avidin monomers~~ are joined directly or via a linker, thus creating the new C-terminus

and the new N-terminus, and the ~~circularly permuted~~ dual-chain avidin ~~monomer~~ binds biotin or other ligand.

48. (currently amended) The dual-chain avidin of claim 47, wherein ~~in the circularly permuted avidin,~~ the avidin is selected from wild-type avidin, streptavidin, a variant of avidin, poultry avidin, and chicken avidin-related protein (AVR).

49. (currently amended) The dual-chain avidin of claim 47, wherein the original C-terminal amino acid and original N-terminal amino acid have been joined by a linker comprising one or more amino acids.

50. (previously presented) The dual-chain avidin of claim 49, wherein the linker is a hexapeptide comprising four glycine amino acids and two serine amino acids, and a glycine is connected to the C-terminal amino acid and a serine is connected to the N-terminal amino acid.

51. (currently amended) The dual-chain avidin of claim 47, wherein the circularly permuted avidin monomer has a biotin binding affinity that is different from the biotin-binding affinity of wild-type avidin.

52. (currently amended) The dual-chain avidin of claim 47, wherein the circularly permuted avidin monomer has a HABA-binding affinity that is different from the HABA-binding affinity of wild-type avidin.

53. (withdrawn) The dual-chain avidin of claim 47, wherein the avidin monomer has been mutated.

54. (canceled)

55. (withdrawn - currently amended) The dual-chain avidin of claim [[54]] 53, wherein the avidin monomer has been mutated by changing tyrosine 33 to histidine (Y33H), isoleucine 117 to cysteine (I117C), serine 16 to alanine (S16A), threonine 35 to alanine (T35A), and/or asparagine 118 to methionine (N118M), as referenced by SEQ ID NO: 1.

56. (currently amended) The dual-chain avidin of claim 47, wherein the two circularly permuted avidin monomers are fused together directly or joined ~~by means of~~ via a spacer.

57. (previously presented) The dual-chain avidin of claim 56, wherein the spacer is a peptide spacer of about 1 to 40 amino acids.

58. (previously presented) The dual-chain avidin of claim 57, wherein the spacer is a peptide SGG or SGGS (SEQ ID NO: 30) .

59. (currently amended) A dual-chain pseudo-tetrameric avidin, comprising two dual-chain avidin molecules (dcAvd) of claim 47.

60. (previously presented) The dual-chain pseudo-tetrameric avidin of claim 59 that binds biotin.

61. (previously presented) A single-chain avidin (scAvd), comprising the two dcAvd molecules of the dual-chain pseudo-tetrameric avidin of claim 59 fused together to form a single polypeptide.

62. (previously presented) The single-chain avidin of claim 61, wherein the two dcAvd molecules are fused together via a linker.

63. (previously presented) The single-chain avidin of claim 62, wherein the linker is a 12 amino-acid linker GGSGSGSGSGSG (SEQ ID NO: 31) .

64. (previously presented) An isolated polynucleotide encoding the dual-chain avidin of claim 47.

65. (previously presented) A recombinant vector comprising the polynucleotide of claim 64, wherein the polynucleotide is DNA.

66. (previously presented) A host cell comprising the polynucleotide of claim 64, wherein the polynucleotide is DNA.

67. (previously presented) A method for producing a dual-chain avidin (dcAvd) comprising expressing the dual-chain avidin in the host cell of claim 66, wherein the dcAvd is encoded by the polynucleotide.